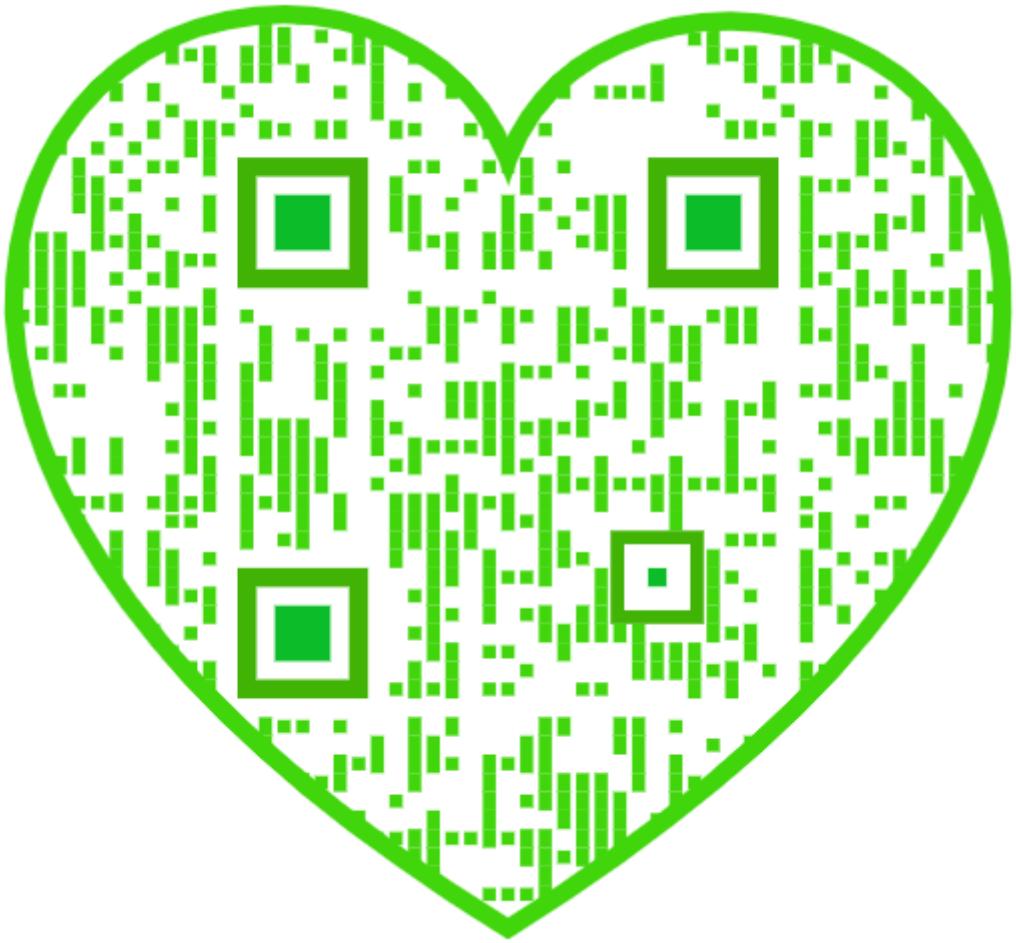

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TRADITIONS OF BEAUTY IN THE NEW ERA OF THE MACHINE

ROBERT AMORY, *President*
The National Association of Cotton Manufacturers

COTTON as a fibre can be made into the most beautiful and sought-after fabrics. Consider the hand-spun and woven turban cloths of the Indian Rajahs of old—cloth a yard wide yet fine enough to draw through a lady's ring! When spread on the grass at evening the dew would make it so transparent as to be invisible. Every thread perfectly smooth, round and even! Cloths of such beauty and costliness available only for Princes and Rajahs.

In more recent years the widespread economy of machinery has made the ordinary cotton fabric the low-priced clothing of the world.

Today the American public, with its great purchasing power, is rapidly becoming educated to the use only of beautiful things. With the development of good taste in dress goes the ability and willingness to pay for desirable fabrics. An excellent and inspiring example is the silk industry of America which, during the last generation, has grown to be the largest in the entire world. Three-quarters of the raw silk shipped from the Orient passes through America's mills. The reputation the American women enjoy of being the world's best dressed women is due, in no small degree, to the excellent quality and beautiful designs of America's silks. I do not in any sense wish to belittle the great technical achievements of the silk industry by pointing out that their success is due rather to their ability as stylists than their shrewdness as manufacturers. No effort has been made to make American silks cheap at the expense of quality to the detriment of design. We should look down on the vicious practice of imitations in weave, name, or pattern. Beautiful cottons made in American mills and worthy of comparison with American silks can do the latter no harm in a competitive sense. There is ample room for all truly lovely textiles.

A BRIEF NARRATIVE OF A GREAT FIBRE

A great industry depends on the men in it. Skilled workmen and skilled management for the latter exists in and must be created from the ranks of the former. Because of their skill and workmanship, New England cotton mills have led in the design of fine cotton fabrics which tempt the consumer to buy because of their beauty and not from simple necessity. The great public do not yet realize to what an extent this application of art to cotton manufacture has grown. Nor do the manufacturers, themselves, yet fully realize the possibilities and extent to which this appetite for beautiful cloths can be extended. It is one way to meet the problems of higher priced raw material and rising costs of manufacture.

It is with these objectives in our minds that The National Association of Cotton Manufacturers is showing in a miniature exhibition a few of the beautiful creations of today made in New England from cotton. With them are shown examples of the handwork in cotton from past centuries. A thorough knowledge of the history of art is necessary to the development of the beautiful and tempting cotton fabrics of tomorrow.

The handwork of the past centuries is almost a lost art. Machinery has taken the place of the exhausting handwork of the past for clothing the world. Let machinery directed by brains and knowledge go surely forward on its next stage and make the beautiful, handwork, cotton art creations of past centuries available in quantities, not alone for princes and rajahs but for the educated and tasteful public of America.

A BRIEF NARRATIVE OF A GREAT FIBRE

M. D. C. Crawford

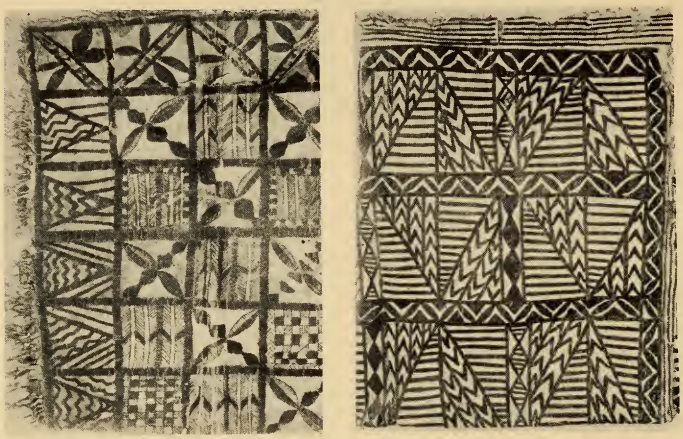
Our first contacts with the cotton fibre, whether in the form of authentic literary record or in actual fabrics taken from immensely ancient graves, show high development not alone in artistic concepts, but in technique, in the excellence of yarn and fabric no less than the intricacy of design. It is already a thoroughly established, highly complex art when it comes to our historic consciousness.

All of our modern knowledge of the art of fabric construction, each fundamental weave and method of applying design we inherit from misty, archaic civilizations, from races that we know only as shadowy phantoms of the past.

THE MYSTERY OF COTTON'S ORIGIN

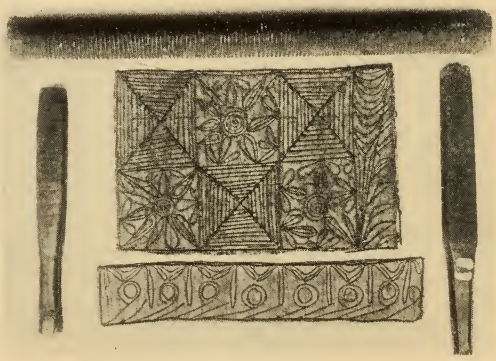
It is an open question whether cotton was independently discovered and cotton technique independently developed in Asia and in the New World along the Pacific coast; or whether originating in Asia, it came to the New World in a mysterious stream of migration, which, flowing for a period, was interrupted by some unknown natural catastrophe, long before the oldest living races in either hemisphere took form.

It is natural that we should lean to the supposition favoring an Asiatic origin, since the geological evidence is clear that human life first came to the Americas from some part of Asia. The fact that the culture of cotton in archaic America and that the distinctly Asiatic types of loom have the same geographical distribution in this hemisphere, and the strong similarity between Indian and prehistoric Peruvian techniques, may be regarded as circumstantial evidence of this descent. We know also that the Pacific Islands, volcanic in origin, are gradually sinking, and it is possible that in the past there



South Sea Island tapa or pounded bark cloth and implements used in its manufacture and decoration. This technique and type of design surely suggests a textile origin.

(American Museum of Natural History)



may have existed an uninterrupted chain of islands between the mainland of Asia and the mountain-guarded desert coast of the land of the Incas.

In support of this interesting theory are certain records of civilization in the still existing Pacific Islands. There are myths, significant customs and fragments of arts that are at least suggestive.

In support of the theory of a double origin is the fact that the cotton plant in endless varieties of wild forms is found all over the tropical and semi-tropical world; and it must be fully admitted that the curious nature of the opening boll, the contrast of its whiteness to the surrounding plant colors, would always attract the attention of primitive man in his endless quest for fibres to make a cord.

It is also perhaps truthfully stated, given the cotton fibre and a basic definite type of loom (such as the two-barred loom) plus incentive to progress, that two peoples, if allowed time sufficient, might independently arrive at an exhaustion point of technique, reach the limit of the capacity of their tools to express new creations, and from these very limits achieve a superficial similarity.

It is highly significant, however, that in every other portion of the globe where cotton culture developed, we can trace its origin to India. For example, China, later Egypt, the islands of the Indian Ocean, the coast and the dim interior of Africa, Spain and Europe, give unquestioned evidence of direct or indirect contact with the region roughly bordered by the Ganges and the Indus.

The long and fruitless effort of Europe, with the exception of Spain, to master the technique of cotton production, should be proof sufficient to us that the problem was never simple. Italy, France and the Low Countries were master weavers and spinners of silk, wool and flax, centuries before they could make any cotton materials at all comparable to the products of the East. Spain under the Moors, was a single exception to this rule, and here the exception is only apparent, for the master craftsmen of old Barcelona and Cordova were lineal descendants of the great weavers and spinners and dyers of the East.

With these facts in mind, and making due allowance for scientific aversion to sensational statements, I am strongly inclined to the belief that cotton culture, indeed many of the technical problems, were first solved in India, and through some mysterious method of migration, transferred to the Pacific coast of South or Central America.

No technical man, familiar with the fabrics of Central and Southern Asia, and the marvelous grave cloths from Pre-Inca Peru, and such fragments as have come down to us from the Mayan and Aztec cultures, can doubt for a moment a common origin. That the actual

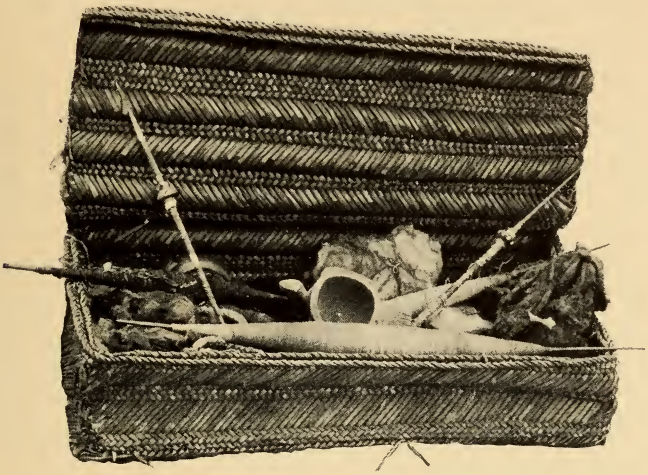
proofs of this are lacking, is in itself of little moment. It unquestionably occurred at a period of time infinitely more remote than our rudimentary historical conceptions based on a narrow and limited European tradition familiarize us with. We must allow for a period of time sufficient for a people in an admittedly low state of culture to have arrived at a great civilization, in many respects equal to Europe's in the Middle Ages, and in textile skill far superior.

Ancient Peru and the great cultures of Central America lack, perhaps, certain requisites of civilization, according to the inelastic interpretation placed upon this term by historians. They knew neither the wheel nor the use of iron, and the llama and the dog were their only domesticated animals. There was no written language in Peru, although in the Mayan area a partially phonetic alphabet, a most amazingly accurate knowledge of astronomy, and a calendic system rather more perfect than our own, indicated an intellectual development of the highest order.

THE GREATEST TEXTILE RECORD

In the great textile arts, particularly in cotton, their supremacy is unquestioned. No people ever surpassed their mastery of loom and spindle, and no people have left so perfect a record of this achievement. Did the world contain no other textile knowledge than may be garnered from the beautiful fabrics taken from their innumerable grave sites, we should not lack for any type of fabric we know today.

The people whose intellectual efforts and patient skill produced such miracles, had passed away before the Spaniards came to the New World. How ancient their civilizations are, no man may surely say. A generation of patient research and the comparison of a great mass of interesting facts, still leaves their problems unsolved. We can only refer to them as prehistoric, beyond the ken of historic research.



Work basket from Ancient Peruvian grave showing spindles, spinning bowl, bits of fibres and yarn.

(American Museum of Natural History)

Peruvian tapestry.

(American Museum of Natural History)

EUROPEAN COTTON KNOWLEDGE COMES FROM INDIA

So far as our own civilization is concerned, including Europe and America, our entire knowledge of cotton culture came from India. The two-barred loom, containing even in its rudimentary simplicity the principle of the most complex modern looms, the later-day principle of spinning, the names of many of our fabrics, the word "cotton" itself, are all proof of this fact, even were more direct evidence lacking.

The earliest literary record of cotton comes from India. In the Eighth Century B. C. mention is made of cotton in the sacred laws of Manu, and it is here spoken of not as some new plant or technique just discovered, but as well established, a common and familiar part of everyday life, and consequently already of great antiquity. For example, the powerful and ancient Brahmin caste wore a fillet of cotton thread as a distinguishing mark. A religious body of such power would not use any material unless it were already hallowed by long usage and familiarity.

Again, the laws for the regulation of the cotton craft guilds imply that the art of cotton manufacture had passed to some degree at least from a mere household occupation to the full dignity of guildship.

It is with a satisfaction, I know modern cotton finishers will share, that I quote a single passage from this venerable work:

"Let a weaver who has received ten palas of cotton threads give them back increased to eleven through rice water which is used in the weaving. Whosoever does otherwise shall pay a fine of 12 panas." From this regulation it is evident that in India, as long ago as the Eighth Century B. C., they understood how to weight the product. Surely only a very respectable age can have come to such discrimination!

There is little reason to doubt that the ancient Greeks knew cotton and held the fabric in high esteem as an occasional luxury. Herodotus in 484 B. C. writes: "The wild trees of that country (India) bear fleeces as their fruit, surpassing those of the sheep in beauty and excellence; and the Indians use cloth made from this tree wool." With the Alexandrian conquests, cotton culture and cotton conversion were introduced certainly into Asia Minor and perhaps into the Greek mainland. The warlike Macedonian brought farmers and craftsmen and colonized portions of his newly acquired empire. Like other attempts, however, at industrial colonization, in the long run the basic traditions gradually tapered off and died away.

China must have known cotton as an object of commerce at a very early date. Sir Aurel Stein in his excavations in the ruined city of Turfan in the Gobi Desert in 1913, found cotton materials which he dates as from the second century of the Christian era. This cotton was evidently brought along the oldest caravan route from India, and if it appears in the preserving sands of the frozen desert, there is little reason to question that it was also carried into China. But a knowledge of its true nature did not exist until centuries later, even among the scientifically curious Chinese.

The Emperor Wu Tai was presented, according to tradition, with a cotton robe by the Indian Envoy in 600 A. D., and a little later, cotton as a garden plant is recorded in China. But the Arab traders in 900 A. D. make the positive statement that the Chinese had no knowledge of cotton culture, and Marco Polo, 400 years later, remarks that cotton was only cultivated in the southern province of Fu Kin.

CHINESE HORTICULTURAL RESEARCH

There is, however, even stronger evidence of the Chinese lack of information on this important subject. At a very early date the Chinese began a series of commercial explorations through Asia, and these expeditions paid particular attention to the native products, especially agricultural, of each region, and brought back to the homeland such specimens as they believed might be useful.

As early as 126 B. C., the grapevine and alfalfa were transported from Persia to China. Dr. Berthold Laufer, in his scholarly work, *"Sino Iranica,"* gives a long and carefully prepared list of food and medicinal plants exchanged between China and Parthia. Nowhere does he mention cotton. In the translations of the Chinese annals, dating from the first century of the Christian era, Dr. Hirth makes no direct mention of cotton, although many other plants and customs of the people are minutely recorded.

It is thoroughly established that the Chinese traders reached Persia, and perhaps portions of Grecian Asia Minor, before the Christian era. It is interesting to note that these veracious chronicles gave accounts of the different peoples' familiarity with the use of the wild or tussah silk, and their lack of information in regard to the cultivated varieties which were already highly developed in China.

THE ORIGIN OF AN ANCIENT MYTH

Only one indirect reference in the second century A. D. to cotton is made. One explorer mentions a hearsay report, for the credibility

of which he does not vouch, of the "water-sheep" that produced wool for clothes. This is perhaps a forerunner of the imaginative narrative of the Middle Ages, which bears the high authority of Sir John De Mandeville. He refers to the "Scythian Sheep," or the tree that bore lambs. The English romancer, evidently, was less modest than his Celestial forerunner, and actually recounts seeing this miracle, which had great credence in Europe in the Middle Ages, long after cotton had been introduced by the Moors into Spain, and long after Sicily and perhaps part of Italy actually knew the truth.

In Chinese works of the 14th and 15th Century, dealing with technical details of weaving and spinning, appear accurate drawings of the Indian tools, including the gin, and opening bow and the spinning wheel. This is conclusive evidence of the origin of a new technique, and the pictures were unquestionably published to show to the curious Celestial the distinction between the familiar silk and this new and strange fibre. It is doubtful if China became wholly familiar with cotton until the Tartar invasion had produced its full economic and social reactions.

It is equally significant that no cotton appears in the earliest Egyptian tombs, although we know that Egypt had an extensive trade with the middle East for countless centuries.

It is incredible, however, that the old traders from Egypt did not know of this commodity, but since greater value could be compressed in smaller bulk in the form of essences and spices, the cotton goods at that time did not attract their sagacious minds.

DESIGN INFLUENCES COMMERCE

It is also highly probable that at this particular period, the early centuries of the Christian era and a few centuries previous, such designs as existed being largely of a tribal or sacerdotal character, were unfitted for export.

We know that the first silks transported over the old caravan route were in narrow bolts 19 inches in width, undyed. These were taken to the old cities of Petra and Damascus, unraveled, dyed and woven in patterns that suited the taste of the Mediterranean markets. Design controlled the sale of silk, we know. There can be little doubt that the lack of it at this period prevented the spread of cotton.

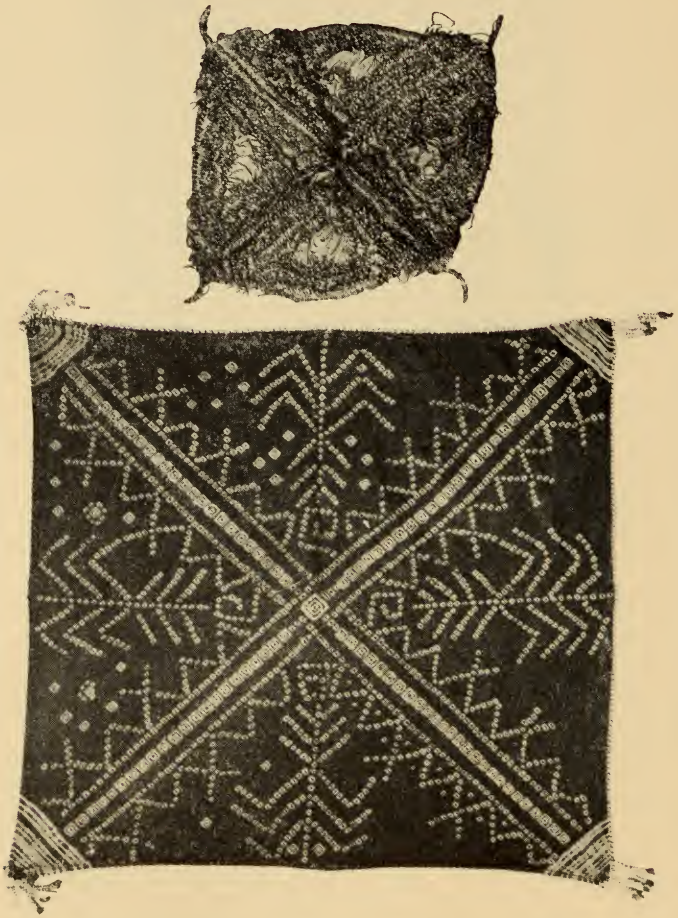
At a later period, India excelled in the dyer's art, and acquired a highly diversified technique in applying color to cotton fabrics. Her carved teakwood blocks for direct printing and for the application of resist waxes and clays reached a degree of perfection never since approached. The simplest form was unquestionably that of tying a fabric with a cord or thread so as to form a pattern and trusting to

Modern tie-dyed fabric from India. The ancient craft skill and traditional design have survived a century of machine production.

(Collection of the Author)

the dye resisting qualities of the thread to produce design by contrast. Warp and weft were independently treated in the same manner, dyed and woven in intricate patterns.

The use of a type of stylus wrapped with woolen yarn to hold molten wax was the predecessor of the little cup of copper leaf used at a later time in Java in the familiar batik technique. The arts of resist-dyeing were taught the Javanese by the Buddhist missionaries of the Seventh Century, perhaps even a few centuries before, by traders; and the Chinese and the Japanese owe their skillful technique in stenciling, dyeing and stamping to European missionaries and traders, Dutch, English and French, who first learned the arts in India. There is conclusive evidence that a great part of Japanese silk design may be traced to the influence of Indian cottons.



Tie-dyed head dress, Bogobo Tribe, Philippine Islands.
(American Museum of Natural History)

The power to produce patterns in, comparatively speaking, limitless repetitions through these methods, gave India a dominant position in the textile trade of the world up to the early periods of development in England and America and the modification of these crafts into modern system of production.

The arts of the Philippine Islands, that attracted the admiration of Portuguese and Spanish explorers who followed Magellan, prove that the Moros or Mohammedan traders had brought their arts with them to these Pacific Islands at an early date. The arts of ancient India are still carried on by certain of the wilder tribes in our Philippine possessions, and owe their origin to the same people who taught the great textile peoples of the Far East, the Mediterranean and Europe the application of design and the use of dyes in cotton fabrics.

THE ARAB AND COTTON

The great modern history of cotton begins with the Mohammedan invasions of India, Syria and Egypt, and the final spreading along the coasts of Africa until they crossed by the pillars of Hercules and conquered the southern portion of Spain.

The Arab was the great trader of those ages. More than this, he acquired cosmopolitan habits of thought and a culture and an experience enjoyed by no other people of his age. No doubt these virile people, absorbing as they went the civilizations of the ancient Mediterranean empires, of Egypt and Persia and the lands of the Hindus, had much to do with the development of the arts and the sciences. They were the repositories of the remnants of old Grecian culture, and inheritors of the later Roman Empire in the East, and they brought to art a new vision, and lifted design above the narrow limits of tribal insignia. Under their influence, the arts of the different peoples whom they conquered either directly or indirectly, blossomed into a new era of creation and in this great revival, cotton played a major part.

While evidence is lacking, there is some reason to believe that with a closer commercial relationship to China and the consequent increased knowledge of silk culture, the wheel commonly used for reeling the silk cocoon became adapted to the spinning of the short cotton fibres. This invention immediately increased the productivity of spinners, hence more equally balancing weaving and make a surplus of fabric above domestic needs.

Of greater importance than even these technical considerations is the fact that the Arab, through the vast interlacing of his protected trade routes, his familiarity with travel by boat as well as land,

Javanese Batik.
(Collection of the Author)

offered to the conquered provinces of the Mohammedan Empire a world market for their surplus products.

From Mohammed's flight from Mecca to Medina, to the conquests of northern Africa and Spain is only a few brief years. Beyond the terror of their arms, their commercial and artistic influence extended. The great trade cities of Italy of the Middle Ages and their younger sisters in Flanders, the walled towns along the northern caravan route to China, the slumberous cities of the Nile, and the forest and desert trails of equatorial Africa, knew the crescent-turbanned traders, the bearded, competent travelers who turned towards Mecca in their prayers.

If we expect the great Roman triumphs and the discovery of America and the equally important (commercially at least) discovery of a water route to India around the Cape of Good Hope, no influence in history was so powerful as that of the Arab and Moorish conquests. In the Dark Ages of Europe, these swarthy children of the Steppes, these descendants of the warriors who first gathered around the Great Camel Trader, kept alive the spirit of knowledge, the kernel of culture. We owe them much, and not the least of these debts is cotton and the arts that made cottons beautiful and desirable.

The mere list of the dates of the Mohammedan conquests shows how rapidly their power spread, and since most of their military expeditions were against peoples of the highest traditions in the arts, it is easy to understand how the conquerors soon imbibed the culture of the conquered. They built not only a military but a commercial empire—an empire founded on the world's love for beauty.

The first invasion of Egypt was in 639 A. D., seventeen years after Mohammed's flight. In 703, Amur-Ibu-Al-Asi invaded the African Mediterranean shores, where Phoenician, Greek and Roman had left more than a trace of their civilization and more than a remnant of their arts. Mohammed Kasim led his victorious horsemen into India in 711 A. D., and Spain was invaded in 712. After the soldiers came the able administrator, after the fanatic the culture-loving merchant prince and his craftsmen.

COTTON IN SPAIN

In the reign of Abdrahman III, justly styled The Great, who ruled in Cordova from 912 to 961 A. D., there was a great infusion of the arts of the East. Cotton, the sugar cane, rice and silk were naturalized. Even today, on the fertile plains of Valencia, the cotton plant grows wild. Cordova, Granada and Seville competed on even terms with Damascus and Bagdad for supremacy in the arts.

There are records, of a somewhat dubious character, that the

Indian painted cotton, 18th century.
(Metropolitan Museum of Art)

Teak wood printing blocks, Delhi, India.
(Field Museum of Natural History)

Arab rulers in Spain from time to time sent presents to the kings of France and to the Roman court, consisting of embroidered and dyed cotton garments. There are also treatises in Arabic as early as the Twelfth Century, dealing with the scientific cultivation of the cotton plant and mentioning the fact that cotton was introduced and cultivated by the Mohammedan conquerors of Sicily who reigned there from the ninth to the eleventh century.

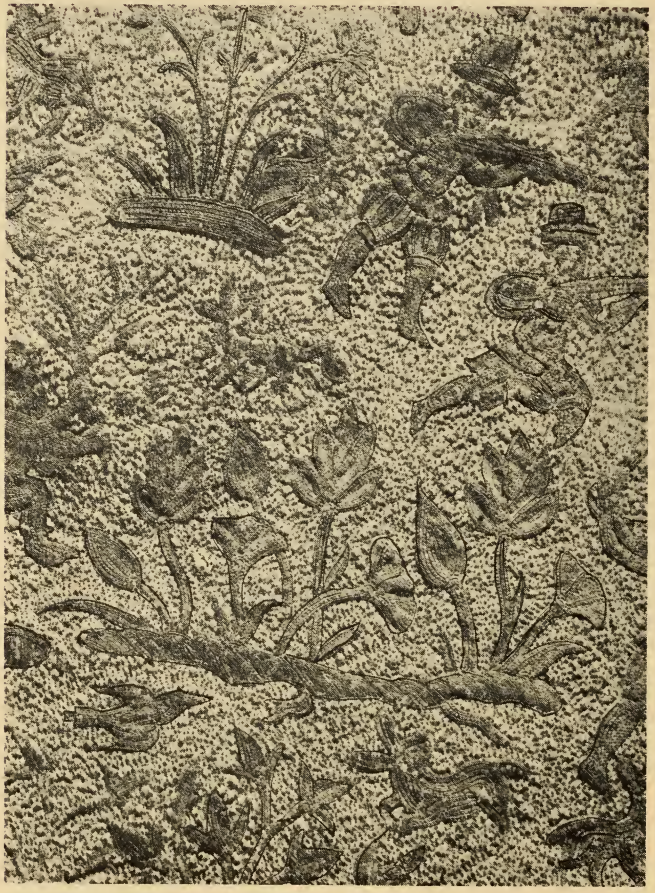
In the fourteenth century, the Spanish-Arabic historian, Ebn-Al-Khatib, writes: "Here you will find also the coccus with which the cotton stuffs are dyed, for there is a great abundance of cotton, as well for commerce as for use in manufactures and the cotton garments made here are said to be far superior to those of Assyria in softness, delicacy and beauty." If the cultured savant was favoring his home town in the same spirit that actuates our energetic Chambers of Commerce, it at least proves that the arts of cotton making had reached a high degree of perfection among these luxury-loving people.

Spain expelled her great Moorish craftsmen and merchants in 1492. Had she retained them she might have become the world's great center of the cotton arts, and modern economic history might have been entirely different. It was written otherwise, and the harvest she destroyed was gathered in England and America three centuries later. But one point cannot escape observation—cotton is always referred to as a product of art, a material desirable in itself, not as a cheap substitute.

There was unquestionably commerce in cotton fibre and fabrics at a somewhat later date between Italy and the East, and through Italy with the cities of Flanders. Germany played a part in this early history, and at one time exported to England large quantities, comparatively speaking, of a rough cotton and wool fabric known as "barchent." But the fibre was used only for spinning weft, just as in England, up to the inventions of the mechanical age. Cottons of distinction desired by the wealthier classes, were designed and executed either in India or the Near East.

THE CHARM OF COTTON INFLUENCES EUROPE

In northern Europe and England, the great history of cotton commerce begins with the memorable journey of Vasco de Gama around the Cape of Good Hope in 1497. In the return cargo of the Portuguese navigator were painted cotton fabrics called "calicuts," and from that date up to the present time, such commerce has continued subject to the vicissitudes of all commercial ventures. It is true indeed that as early as the Twelfth Century, cotton fibre was



Two thicknesses of cotton fabric embroidered in European and Asiatic designs, about 16th century, Sicily.

(Brooklyn Institute Museum)

imported into England and used in the manufacture of candle wicks, and also used as an adulterant in rough woolen fabrics, and as an embroidery yarn. But its first deep impression on European culture was as an object of charm and luxury.

Dyed and painted cottons, exported from the East early in the Seventeenth Century, made a strong impression on the wealthier classes of England and many imitations were attempted in wool and linen to satisfy the less exacting buyers.

At the time of the discovery of an all-water route to the East, England was not lacking in textile skill. The craftsmen driven from France and the Low Countries during the previous century, had amalgamated with native spinners, weavers, and dyers. In wool and flax, even in silk, her fabrics did not lack distinction. Cotton could be worked in coarse weft yarns. But the fine cotton she so highly desired was beyond her skill.

The age of mechanical invention will be treated at a later point in this narrative. One point I want to strongly emphasize is, that the desire for cotton, not as an economic factor, but for cotton as a form of art, first incited Europe's inventive imagination. Wool, flax and silk were just as useful, more easily obtained, and for certain purposes perhaps more sensible. But cotton had the allurement of a subtle ,irresistible charm that might not be gainsaid.

It is interesting to note the powerful influence that painted and printed cottons and fine muslins exercised on the taste of England in the Sixteenth and Seventeenth Century. Many English and continental arts can be traced to this source. For example, the rare and highly prized Elizabethan embroideries were attempts to imitate the more desirable cotton fabrics.

The first British East Indian Company was founded in 1600. Very early the traders had to face the problem of style at home. A letter written in 1641 to the Agent at Surat is as follows:

"The Quilts of chints being novelties produced from £5 5s. to £6 the pair, a further supply therefore desired, and both as regards those and the Chintzes more should be made with white groundes, and the branches and flowers to be in collors, and not to be (as these last sent) all in general of deep red ground and other sadder collors."

(*Note*: For modern exchange multiply by 6 or perhaps 10.)

The prohibitory laws against the importation of chintzes and the restriction of the monopoly to the British East Indian Company, led to evasions of the law not unlike modern bootlegging:

"Mr. Steevens, master of the "Swan," questioned as to the information received that he had had 240 pieces of calico for his private trade conveyed secretly on the said ship when in the Downs,

Painted cotton curtain of 16th century from ruined city of Amber.

(Brooklyn Institute Museum)

he confesses to selling 80 pieces to one customer at Deal; but declares he sent everything else of his to the Company's warehouse where it remains until freight was remitted and order given for its delivery. He craves that this error may be overlooked; he will try to recover and return the sold calicoes. The Court, much disliking his setting such a bad example, and having remitted all freight upon his goods, and given him a gratification for having made the Downs as first port, resolves to enact that any captain or master landing or putting aboard ship any goods of private trade brought home by him or allowing others to do so, shall not only be questioned in the Star Chamber according to the King's proclamation, but shall forfeit the Company's gratification of £100 given to the ship on making the first port."

In 1678 a pamphlet was issued entitled "The Ancient Trades Decayed and Repaired Again." Herein the author bewails the disastrous effect which the fashionable desire for Indian cottons has had on the domestic trade in silks and woolens, and flax.

"This trade (the woolen) is very much hindered by our own people who do wear many foreign commodities instead of our own, as may be instanced by many particulars, viz., instead of green sey, that was wont to be used for children's frocks, is now used painted and Indian-stained and striped calico; and instead of a perpetuana or shalloon to line men's coats with, is used sometimes a glazened calico, which in the whole is not above 12d. cheaper and abundantly worse. And sometimes is used a Bengale that is brought from India both for linings to coats and for petticoats, too; yet our English ware is better and cheaper than this, only it is thinner for the summer. To remedy this, it would be necessary to lay a very high impost upon all such commodities as these are, and that no calicoes or other sort of linen be suffered to be glazened."

Another pamphlet entitled "The Naked Truth," published in 1696 is in the same complaining vein.

"The commodities that we chiefly receive from the East Indies are calicoes, muslins, Indian wrought silks, paper, salt-petre, indigo, etc. The advantage of these commodities is chiefly in their muslins and Indian silks (a great value in these commodities being comprehended in a small bulk) and these being the general wear in England.

"Fashion is truly termed a witch; the dearer and scarcer any commodity, the more the mode. Thirty shillings a yard for muslins, and only the shadow of a commodity when procured."

Daniel Defoe, a thinker often in advance of his age, could see in the cotton trade with India only the ruination of the English woolen trades. In 1708 he wrote:

"The general fansie of the people runs upon East India goods to

that degree that the chints and painted calicoes, which before were only made use of for carpets, quilts, etc., and to clothe children and ordinary people, became now the dress of our ladies; and such is the power of a mode as we saw our persons of quality dressed in Indian carpets, which a few years before, their chambermaids would have thought too ordinary for them. The chints was advanced from lying upon their floors to their backs, from the foot-cloth to the petticoat; *and even the Queen herself at this time was pleased to appear in China and Japan. I mean China silks and calico.* (Nor was this all, but it crept into our houses, our closets, and bed-chambers; curtains, cushions, chairs, and at last beds themselves were nothing but calicoes or Indian stuffs; and in short almost everything that used to be made of wool or silk, relating either to the dress of women or the furniture of our houses was supplied by the Indian trade.)

"Above half of the (woolen) manufacture was entirely lost, half of the people scattered and ruined by this and by the intercourse of the East Indian trade."

A volume published in the same year, 1708, entitled "A Plan of the English Commerce" shows that the public's interest in cotton could not be diverted by prohibitory laws, nor by the outcry of the literary agents of the manufacturers of silk, wool and flax.

"The calicoes are sent from the Indies by land into Turkey, by land and inland seas into Moscow, and Tartary, and about by long-sea into Europe and America, till in general they are become a grievance and almost all the European nations but the Dutch restrain and prohibit them." (The result of the prohibitory laws was that Holland did a fine smuggling trade at double profits.)

"Two things among us are too ungovernable—our passions and our fashions.

"Should I ask the ladies whether they would dress by law, or clothe by act of parliament, they would ask me whether they were to be statute fools, and to be made pageants and pictures of?"

The intense desire for Indian chintzes was matched by an equally determined effort on the part of the British Parliament to protect the home markets for cloth of other fibres by excluding these so highly desirable cottons. These restrictions were, however, not sufficient to cause the public to cease from wishing for the forbidden beauties.

The great actor, David Garrick, writing from the Adelphi on the second of June, 1775, to Mr. Guy Cooper, a friendly official of the home government, makes a sprightly and touching request that the chintz bed curtains that had been seized by the custom officials, in accordance with the law, be restored to him so that he may have peace and serenity in his home through the restoration of Mrs. Garrick's prized treasures.

Mr. Cooper replied to this letter with a general indictment of custom house officialdom and eventually succeeded in granting the great actor's human request. The bed with the chintz curtains in question, is now in the Victoria and Albert Museum in London.

J. Cary in his discourse concerning East India Trade, about 1714, showing how it is unprofitable to the King of England, is furious against the trade in calicoes:

"Calicoes and wrought silks are the things I chiefly aim at, and hope to make it plainly appear that those two Commodities do us more prejudice in our manufactures than all the Advantage they bring either to private purses, or to the nation in general, and it were to be wisht the Wisdom of our Parliament would prohibit their being worn in England, else like the ill-favored lean Kine they will destroy the use of our Manufactures. *Few think themselves well drest till they are made up in Calicoes, both Men and Women. Calico Shirts, Neck Cloths, Cuffs, Pocket Handkerchiefs for the former, Head Dresses Night, Hood Sleeves, Aprons, Gowns, Petticoats and What-Not for the latter.*"

If England was disturbed over the effect of cotton fashions on the woolen trade, France felt no less concern over her great silk industry. Both countries passed stringent laws against importing cotton materials and vainly endeavored to protect themselves from the enslaving charm of Indian prints and Dacca Muslins.

The great Benjamin Franklin, philosopher and statesman, was himself caught in the meshes of the same web. One night in the year 1751, his home was entered and his wife's most highly prized dress, made of cotton, was stolen. Franklin, ahead of his time in appreciation of the value of publicity, advertised in the following manner:

"Whereas on Saturday night, last, the house of Benjamin Franklin, printer, was broken open and the following things feloniously taken away, viz., a double necklace of gold beads, a woman's long scarlet cloak with double cape, *a woman's dress of printed cotton of the sort called brocade print, very remarkable, the ground dark, with large red roses and other large and yellow flowers, with blue in some of the flowers, with many green leaves, etc.*"

COTTONS WEIGHED BY THE CARAT

No single phase perhaps of the romantic history of cotton art in India has attracted more attention than the Dacca Muslins.

Pliny mentions these marvelous webs in the first century A. D. He speaks of their gossamer lightness and exquisite beauty, nor can we regard this as a mere rhetorical figure of speech, since Pliny knew

from first-hand experience the finest products of the Egyptian craftsmanship in flax. It is clear, therefore, that he speaks with a comparative in mind. While this great historian does not pose as an expert, he was none the less a man of keen observation, and his familiarity with the textile products of the two nations gives his observations a certain weight they would not otherwise have. But we need not rest the evidence on a mere literary record.

The Indo-Greco statuary of the Second Century A. D., particularly in Ceylon, includes many beautiful representations of Buddha, draped in folds of a diaphanous material. This we have every license to believe was cotton. The delicacy of the folds, the subtle but certain outline of the figure, makes us realize that only the lightest conceivable texture could produce such amazing results. The sculptor had little concern to establish the textile reputation of his people. He was dealing with fact, and his only thought was that his conception of the Lord Buddha should be clad in the most exquisite of known fabrics.

There are many later accounts of turbans of gold embroidered muslins, sent as gifts to emperors, that give poetic expression to the charm of these fabrics. Harun-al-Raschid, of Arabian Nights fame, received one, thirty yards in length, so fine as to be easily contained in a gold cocoanut shell.

The Dutch explorers in the Seventeenth Century brought back to Holland incontestable evidence of the existence of suprfine weaves beyond even the skill of their master weavers to imitate. At this period, no country in Europe was so highly cultivated or so wealthy as Holland, and this fact gives an added weight to their praise.

The names "Evening Dew," and "Running Water," and "The Mull of Kings" were more than mere poetic phrases. They denoted actual weights and constructions, and possibly types of design. The name "Evening Dew" was applied to a texture so marvelously light that when stretched on the bleaching green it disappeared in the evening dew. "Running Water" implied that when washing a fabric in a brook, the textile was invisible. "The Mull of Kings" meant a fabric so fine as to be a worthy gift to a luxury-loving monarch.

Yarns and fabrics were sold by the carat weight, just like gems or wrought gold, and their price depended upon their fineness of count.

It is rather curious that the method of spinning was different from that employed in heavier cottons. The carefully selected long fibre cotton which grew in the fertile Dacca Valley was carefully carded with the jawbone of the baleen fish, the fine teeth of which separated the delicate fibres and laid them in parallel laps. The fine,

evenly balanced spindle of polished wood, with the point resting in a small dish containing water to moisten the fingers, formed the entire equipment of spinning. These artists scorned any such newfangled notion as a spinning-wheel and trusted to the exquisite training and sensitiveness of their fingers.

Centuries of supremacy in this art fortified them in the conviction that no finer tool than the human hand could possibly be invented. Their form of spinning, if not their skill, finds a counterpart in the backward regions of Ceylon and Siam today, and I have no doubt was similar to that employed by the ancient Peruvians.

Technical data on the subject are lamentably scanty, but from what I have been able to gather, the size of the yarns varied between 250/1 and 500/1 singles. It must have been very strong and remarkably even to permit of its being woven in textures. The fabrics were about 36 inches wide and counted about 56 square. In most instances a few shots of tinsel yarn were added to the end of the piece, and at times a powdering of textile flowers added to the surface.

I know that on hand mules of England, even within modern times, yarns as fine as No. 500's have been spun, and when plied, used in the Calais lace trade; and I cannot conceal a profound admiration for Samuel Crompton's genius since his invention of all others was the only one that vied with the human hand. When, however, during the reign of Queen Victoria, an attempt was made to weave these yarns, it was only possible to do so after many costly failures, with the aid of an unusually skillful weaver in the southern part of France, accustomed to the finest of silk. Even then, the handkerchief presented to Her Majesty was estimated to have cost in the neighborhood of five thousand dollars.

There is little wonder, therefore, that an Englishman, deeply concerned at the havoc wrought in the linen and woolen trades of his native land, by the intrusion of Indian fabrics in the Seventeenth Century, should write with some bitterness: "Muslins at 50s. a yard, and then the mere shadow of a commodity!" While the specimens of these muslins have either entirely disappeared or lie locked, forgotten, in the vaults of some museum, there is no question that their fineness and charm are not myths of a dim yesterday, but actual facts, and that in them cotton reached its zenith in the world's commerce.

COTTON AND THE NEW WORLD

The first natives that Columbus saw when he landed on the Island of San Domingo not only wore cotton, but presented him with baskets of fibre, spindles of yarn and pieces of fabric. It was surely

Aztec girl being punished for poor spinning.

American Museum of Natural History

Aztec chief at time of Montezuma.

American Museum of Natural History

Aztec loom from Codex Mendoza.

American Museum of Natural History

a natural error for the great Genoese to believe that the finding of cotton was proof sufficient that the lovely island was a part of the Indies towards which his hopes so eagerly led him. No Europeans knew as much regarding cotton as the Spaniards and Italians, since cotton fabrics from the East, or made under Eastern influence in Moorish Spain, were familiar, if expensive, luxuries. Columbus brought back with him to Spain cotton plants in fruit to prove to Ferdinand and Isabella that his first voyage had been successful.

Very soon after Cortez conquered Mexico, cotton fibre and fabric were exported to Spain and formed no inconsiderable part of the wealth of this romantic commerce. And within a few years the fibre from this part of the world began to supplant the cotton of India and the Levant. Cortez was profoundly impressed with the great amount of cotton fabrics and fibre paid as tribute to the Aztec rulers by their conquered cities. It has been estimated that this amounted to a sum equivalent to $33,000,000, basing the price of cotton on an eight cent a pound average. Within a single decade the annual shipments of cotton fabrics from Mexico to Spain exceeded 1,500,000 yards.

Embroidered strips from Mexico showing Spanish and Moorish design.

(American Museum of Natural History)

In all the conquests that followed, the Spaniards speak with unstinted praise of the skill of the natives in cotton spinning, dyeing and weaving. They were stern critics, more often than otherwise unduly severe on their conquered peoples. But the exquisite fabrics, the rich colors, the vigorous designs, swept away all prejudices.

The natives very quickly adapted not only Spanish design, but Spanish looms and spinning devices. They copied with amazing fidelity the figures on coins, the ornaments in the churches and all else possessed by their white masters. In many instances, admiration for the exotic designs completely overshadowed their own arts. Today in many parts of Latin America, the native craftsmen produce designs that came originally from the Moorish invaders to the Spaniards, and finally to this New World beyond the Atlantic.

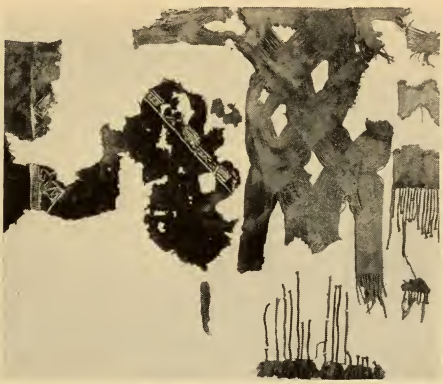
The pre-Columbian map of cotton does not include a single state along the eastern seaboard. From the middle of the State of Utah, through the Southwest, perhaps including the western portion of Texas, Mexico, Central and South America, the archaic culture of cotton was general. In certain favored regions, it reached a concentration and a complexity of technique and design never exceeded in any other portion of the world.

OLDEST COTTONS IN THE UNITED STATES

Cottons have been found in our own Southwest still adhering to the seeds, that are dated by the archaeologists at one or two thousand years before the Christian Era. A fortunate accident has preserved a very splendid example of tapestry weaving found on a mummy in a cave in Grand Gulch, Utah, and estimated to date from about the Christian Era, or even earlier. In the Brooklyn Institute Museum is a knitted cotton shirt and an example of stenciling from nearly the same period. From the silt and mud of the sacred pool of Chitchen-Itza cotton brocades, embroidery and fine ducks were recently recovered, dating from the seventh to the twelfth century A. D.

Some years ago, Dr. Stafford of the Department of Agriculture discovered that among the Hopi Indians there was still cultivated a distinct species of cotton acclimated to their desert conditions.

Only ideal conditions permit the preservation of fabrics for long periods of time. The varied climate of Mexico and the moist character of the equatorial civilizations of Central America have practically completely destroyed the actual material record of their textile skill. A few fragments, however, remain attesting the fact that this skill was of a very high order. And from pottery, wood and stone carving and jade etching we have an even more complete evidence.



A child's knitted cotton garment and stencilled cotton fabric from Grand Gulch, Utah, from a grave cave perhaps 1000 *years before the Spanish Conquest.*

(Brooklyn Institute Museum)

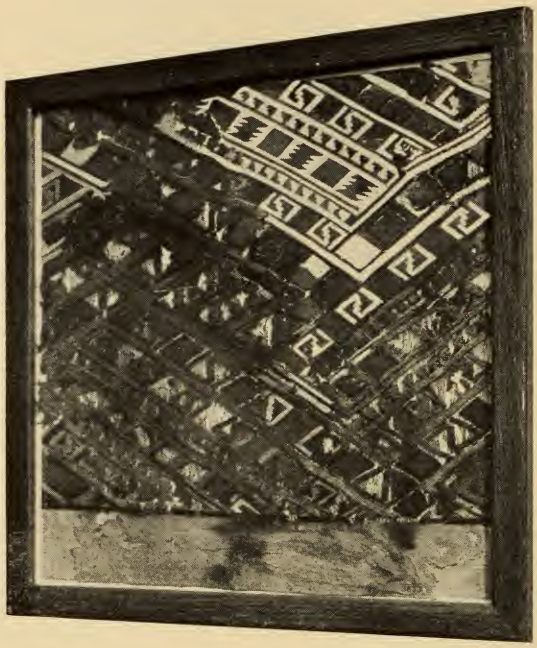
THE ANCIENT MASTER WEAVERS

The world's most perfect textile record comes from Peru. Rich as are the art treasures found in Egyptian tombs, their technique is comparatively simple. Tapestry, embroidery, and a form of painting are the limits of their media. Their richest designs are not in the true sense textile, but a reflection, even a debasement, of the pictorial arts of Greece and Rome.

In Peruvian webs there is not alone an exquisite fineness of craftsmanship, not only a peculiarly racial and highly developed art, but a varied technical understanding which includes every fundamental type of fabric we know today or that, so far as records go, was known in Asia.

We owe the preservation of this priceless record to peculiar natural conditions.

Peru, west of the Andes, is one of the earth's most complete deserts. Here rain falls scarcely once in a quarter of a century. Such water as the country enjoys, comes from the short rapid streams formed by the melting snow and ice of the great ranges of mountains that interrupt and congeal the rain clouds from the Atlantic. Even today, after centuries of barbarous neglect, the major part of the water supply, even in the cities, comes from the remnants of a vast



Cotton tapestry found on mummy in Grand Gulch, Utah.
Oldest designed fabric in United States, pre-Christian.

(*Museum of the American Indian*)

irrigation system built by peoples conquered by Pizarro in 1532, or by their predecessors. For Peru had two great eras of culture. One era we know of from direct Spanish contact, and another had already passed away when the Incas themselves first emerged from their mountain home.

In the textile arts, these people had no peer, or at least no people have left an actual record that can compare with theirs. They were expert in wools and in cottons and made from the maguey a fabric as fine as the average linen from Egypt. They grew two types of cotton, one a fine white staple, the other a reddish brown of rough character, highly prized for its color.

PERUVIAN TECHNIQUE

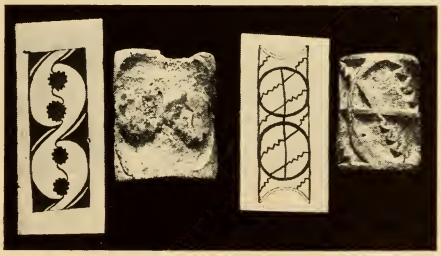
Their implements, even compared with those of Asia and Europe of the pre-machine age, resembled the toys of children or the tools of artists rather than the implements of industry. The loom was simply two parallel bars attached to the branch of a tree and the ground, or stretched between posts which held the warps taut. Except in the case of small ribbon looms, the warps were attached to a soft, many plied cord that was firmly bound to the loom bars. They had no shuttle, but used their spinning bobbins to insert the weft, and a heavy, polished and edged piece of hard wood to drive the weft into the shed.

I am strongly of the opinion that certain implements usually classed as hair combs, made of polished pieces of palm wood, served a double purpose as toilet articles and weaving reeds. It is difficult to account for the exquisite fineness of weaving on any other hypothesis.

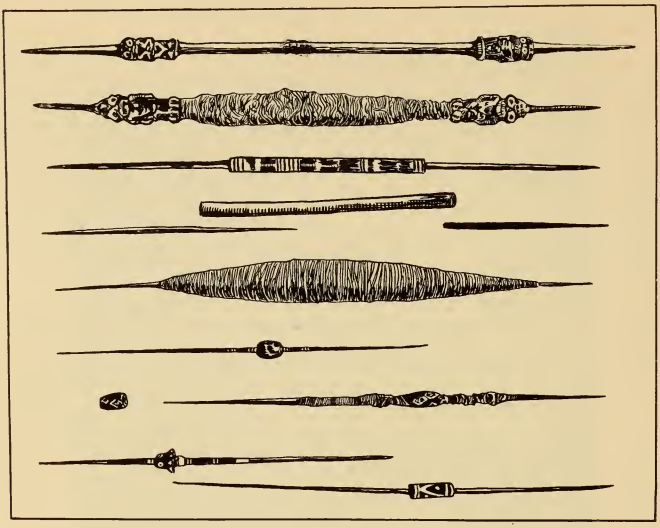
Their spinning implements were even simpler: a polished, delicate bit of palm wood, averaging perhaps a foot in length, tapering to a rounded point, and at the greatest diameter about as thick as a fine paint brush; two short bobbins thrust into a section of reed; and a thicker and larger stick carved at either end with the head of an animal or a human figure, and used to double and twist.

Certain shallow clay bowls are usually found in the ancient baskets of the forgotten craftsmen. These probably contained water to moisten the fingers of the spinner and correct the dryness of the Peruvian atmosphere.

In the vast collections of the American Museum of Natural History, I discovered cotton in the following forms: in the seed, in uncarded lint, in broad laps carded and bound in shapes not unlike miniature beehives. I assume that the seeds were first removed by hand, the lint carefully dusted, and then pulled apart, much in the

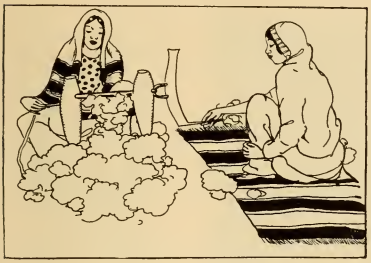


Pottery printing rollers from pre-historic Peru.
(American Museum of Natural History)



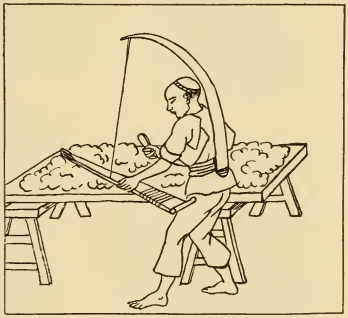
Spindles, doublers and weaving bobbins from pre-historic Peru.
(American Museum of Natural History)

Process of cotton preparation from pre-historic Peru. Cotton Bolts—red and white. Fruited seeds. Opened fibre. Carded Lap. Cone prepared for spinning.
(American Museum of Natural History)



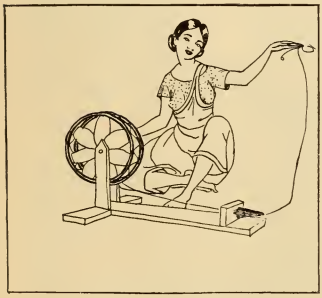
Indian women with primitive roller coton gin.

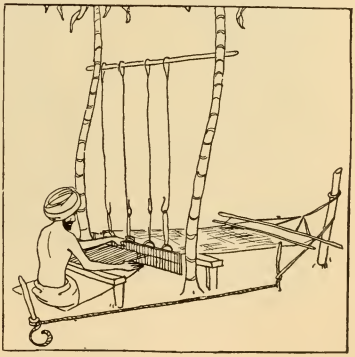
Primitive cotton opening in India and China.



Hindu woman spinning cotton on the primitive wheel of India.

The story of textiles
Perry Walton





Hindu weaver at his loom.

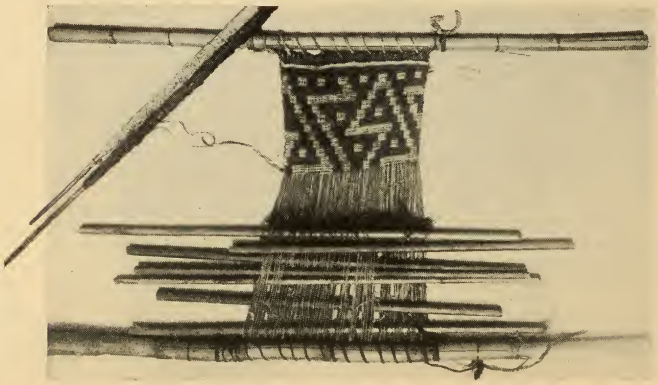
The story of textiles
Perry Walton

way a cotton tester grades the staples, and these parallel fibres matted softly into a carded lap and formed into the above-mentioned cone.

From a rare pottery vase, we learn that this cone was held under the arm and the fibres gently pulled out and twisted into a roving perhaps a couple of inches in length. This roving was then attached to the spindle. The point rested in a pottery dish and the upper end slanted away from the spinner. Draft and twist were produced between the two hands. The rest of the story is but an account of that exquisite skill that comes from long practice and the healthy human desire to excel in any competitive art.

In the middle of each spindle was a little bead of carved stone or clay or sometimes of painted reed, that prevented the completed yarn from slipping off and forming a hopeless tangle. These beads may have indirectly aided the spinner to maintain an accurate centre in spinning but, unlike the whorl used in Europe and later introduced by the Spaniards, did not act as a fly wheel.

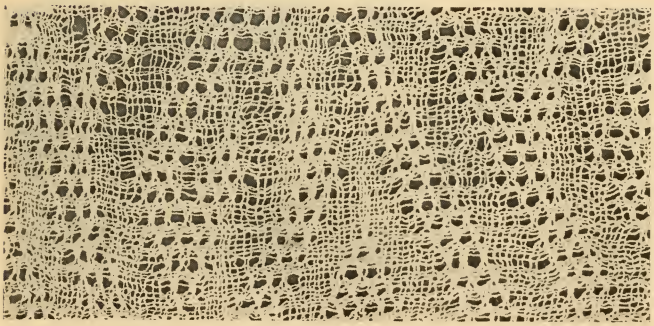
The fineness of these yarns is remarkable when the implements are considered, and when the character of the cotton is taken into account. I have examined yarn of about the same diameter as 250/s, even 300/s, and 150/s and 100/s are not uncommon. Even in these most delicate numbers, there is an evenness and solidity beyond praise. In point of character, their yarns are perfection, standards yet to be reached by any European or American achievement. They were adept in plying yarns, two, three and five, and even seven-ply often



Loom with unfinished double cloth of white and red cotton showing reeds used to make sheds and weaving bobbin, pre-historic Peru.

(American Museum of Natural History)

Characteristic Peruvian designs.
(American Museum of Natural History)



Cotton gauze, pre-historic Peru.
(American Museum of Natural History)

occurring, and a combination of hard and soft twist, to give a perfect cylindrical quality for fine tapestry warps, shows that their results were never accidental. They understood the practical and artistic values of the crepe twist and often used it in their weaves.

Their fabrics vary from coarse ducks to exquisite gossamers. Double cloth, ginghams, voiles, brocades, embroidery (most expert, and built on entirely new principles), leno, tapestry, pile knots, lace and resist dyeing roller and block printing, give a good idea of, but by no means exhaust, their technical list.

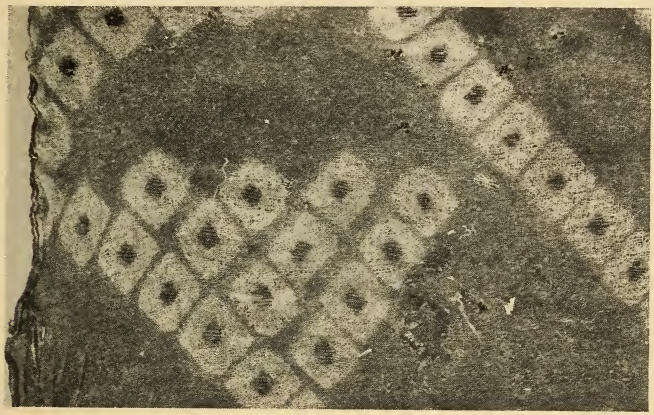
Their finest fabrics were spun and woven in the women's convents. The inmates were in theory the virgin brides of the sun and devoted their lives and talents to making beautiful fabrics for the Incas and those whom the Incas delighted to honor. But even in

Embroidered cotton veil of pre-Inca Princess. The delicacy of yarn and the perfection of spinning mark this as a textile masterpiece.

(American Museum of Natural History)

graves of the humblest nature, the same techniques occur, the same designs and colors.

Peruvian designs must in fairness be ranked among the world's greatest decorative arts. It is true that their national character unfits them to some degree for our use without modification. They had a religious and tribal significance to their creators, a relationship to their aspirations and hopes and lives that is of course lacking for us. But it satisfied them completely, and expressed their attitude towards both the material and the spiritual world.



A type of tie-dyeing from ancient Peru, identical in technique with the craft in India today.

Specimen of resist dyeing from pre-historic Peru. The fabric has been rolled on the bias, tied and dyed. It is identical with the method pursued in India today.
(American Museum of Natural History)

In ancient Peru pottery took the place of painting. Every important event was recorded in this art. Native woman spinning cotton thread.

American Museum of Natural History

THE NEW AGE AND THE OLD TRADITIONS

The beginnings of automatic machinery, scientific division of labor, and continuous or serial production became clearly defined as an economic factor in England during the forepart of the Eighteenth Century. This cannot, however, be regarded as an isolated British intellectual phenomenon. We must consider each great economic event in relationship to its background, and we must, therefore, in fairness see the early beginning of the Machine Age in Continental Europe.

The improvement in the loom types, experiments in the spinning machinery, and a great specialization among skilled labor were already far advanced in France, Holland and Italy in the Seventeenth Century. And had not other causes interfered, it is but just to assume that the inventive genius of these peoples might have at least paralleled the intellectual triumphs that have made the names of certain English and American inventors forever memorable in economic history.

The old industrial order, a reminiscence of the mixed traditions of Roman civilization and Nordic custom, attained its highest expression in the craft guilds of the Middle Ages. These, however, had reached the limits of their usefulness, and clearly showed evidences of decay in the early part of the Seventeenth Century, perhaps even as early as the middle of the sixteenth.

The sudden interruption of economic conditions in Europe and in England, due to the great world commerce which followed the age of discoveries and the circumnavigation of the globe, was the final death blow to these ancient methods of production.

The industrial centres of France, Holland and Germany as well as England, clearly foresaw disaster, and through prohibitory laws endeavored to maintain their position in the face of the inevitable. But Europe was not destined to solve the enigma, for over the continent lay the shadow of even greater changes.

The social fabric of life had first to be adjusted before the new principles of production could be safely introduced. The long series of religious and political wars, the growing poverty and discontent among the middle classes as well as the peasants, made impossible that security and leisure essential to economic growth and mechanical development.

The scenes were already in preparation for that great drama we know in its final form as the French Revolution, and its meteoric aftermath, the Napoleonic incident. Dimly seen by a few sagacious men, but affecting all phases of thought and life, and reaching even little America across the ocean, the stark figure of modern democracy rose slowly from the ashes of bigotry and tyranny. Political necessities, military preparations and activities, excluded the calm consideration of economic and industrial problems, but by no means protected Europe from the evil effects of transgressing these unwritten laws.

If we date the beginnings of the causes that led to these events from the reign of Louis XIV, and terminated the visible efiects of the Napoleonic disturbances with the Commune and the beginnings of the Second Empire, almost three-quarters of a century of vital economic history had passed by, leaving France and Central Europe almost untouched, and their former world commerce at the mercy of machines and mechanical methods of which they had little cognizance.

England and young America were already in the full stride of the new and revolutionary methods. Machines, organized diversified labor, water and steam power, and the vital training of men in the mechanical arts, had produced endless wealth for the world-encircling

commerce of the British Islands and their recently emancipated colonies. And when France emerged late in the Nineteenth Century, war wearied and harassed with debt, she had only her courage and the tradition of her power to create beauty, with which to face the world in a brave attempt to re-establish her economic position.

But the very limitations of her powers of production in the end were her salvation. England and America in their organized efforts to conquer the difficult mechanical problems presented by the adaptation and perfection of the new machines, the introduction of steam and water power, the reorganization not only of commerce and banking, but of labor, had lost to a large degree those traditions of design and beauty that France had retained as a reminiscence of her guilds. And almost before her succesful rivals realized it, the markets of the world, affected by a desire to possess beauty, were centered in France. France still retains this supremacy in design, and will retain it as long as she keeps at least a skeleton organization of her handcrafts.

It is difficult to separate the mechanical from the social history of England during the latter half of the Eighteenth Century, nor can one possibly be intelligible without some understanding of the other.

The devastating wars of the Continent, in which England played her part, the revolt of her colonies in America, the contest between the Liberals and the Tories in her home politics, all tended to restrict production at home, and to make access difficult to the markets which she had formerly looked to for the supply of her needs. Consequently, the cost of living in England rose in leaps and bounds, and the necessity to produce in ever-increasing volume devolved upon her manufactures. The condition of the laboring classes in England during this time was intolerable, beyond any modern parallel we might cite, with the possible exception of Russia.

At the same time the solid fabric of her social life was largely undisturbed by the great events on the Continent. Her own revolution a century before had secured her from undue disturbances, just as her narrow seas protected her from the direct physical effects of the wars. There was, therefore, a strong economic pressure and incentive as well as a powerful artistic urge to master the secrets of fine cotton spinning. The half century of intensive and brilliant invention which underlies all modern production must be considered in the light of these opposite mental attitudes.

In another portion of this brief paper I have outlined the important part that Indian painted and dyed cottons played in the artistic and fashionable desires of this age. I have now given some skeleton suggestions on the economic and political pressure of this time.

The single remaining factor to consider is that the British colonies in America and the Spanish possessions to the southward had already begun to ship quantities of raw cotton to European and English markets that seemed to be on the whole better adapted to their mechanical needs than the cottons of the Levant or the Far East.

England had, therefore, the three-fold pressure of a strong artistic desire on the part of her people that could not be gainsaid by any prohibitory laws; an economic pressure that no people had ever experienced before and successfully survived; and the allurement of the possibilities of increasing almost indefinitely the supply of raw material and her export markets.

THE HALF CENTURY OF INVENTION

It remains only to mention the names and the dates of the small group of men who were responsible for the great changes in methods of production, and who marked an epoch, not only in English, but in world history. It is in no sense derogatory to the genius of these men to say that they were largely the product of their own age, and that the merchant, the economist and the mathematician had aided largely in preparing the fertile soil for their cultivation. Their lives have been so often discussed and their records so completely written during the last century that a mere chronology of events is all that may be permitted in these pages:

1733 Invention of the fly shuttle by John Kay of Bury.
1737 Invention of the roller spinning machine by John Wyatt.
1738 Mechanical carder invented by Lewis Paul.
1764 James Hargreaves invented the spinning jenny.
1767 Richard Arkwright invented his roller spinning frame.
1768 Arkwright applied water power to his machine.
1775 Arkwright established the first cotton factory.
1779 Samuel Crompton invented the spinning mule.
1785 Edmund Cartwright invented the power loom.
1790 Samuel Slater established the first successful cotton mill in America.
1793 Eli Whitney invented the cotton gin.
1814 Horrocks applied the power loom to cotton weaving in England.

The invention of the power loom by Cartwright in 1785 was not perfected until 1814 by Horrocks, in England.

Late in the Fall of the same year, Francis C. Lowell, after a shrewd investigation of the progress of invention in Scotland, operated the first power loom in Waltham, Massachusetts. The power

was applied by a man turning a crank. Shortly after this, coarse cotton goods were produced in this organization by power looms. This is another evidence of how closely the American organizations followed the British.

It must be remembered in defense of the organizers of industry in both England and America, that the patent laws of this time were very different from the patent laws of today.

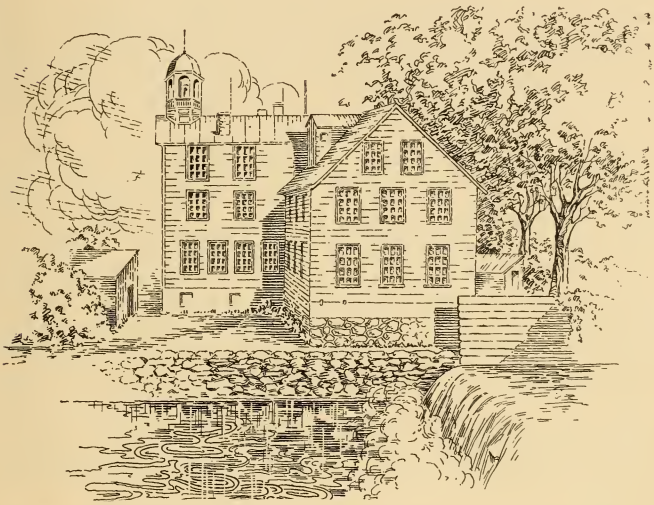
Among these inventors two men stand out, by the brilliance of their vision and the originality of their inventions. Another man is distinguished by the fact that, while his inventions may not have had the inspired originality of the other two, it was his constructive mind which first grasped the possibility of organization, wherein a diversification of labor, specialization of function, serial production, and application of power, found its first expression.

The invention that brought the fine cotton industry within the reach of the English-speaking people and transferred it from its home in India, where for thousands of years the technique and art had ripened, was that of a spinner-musician of Bolton, England—Samuel Crompton. His invention of the mule in 1779 for the first time made possible the spinning of cotton yarns strong enough to be used as warp and fine enough to be woven into the desirable muslin and the ground cloths for the finer English prints.

Eli Whitney, graduate of Yale, and citizen of the State of Connecticut, invented the cotton gin in 1793, which made it possible to remove the tenacious seeds from the American upland cotton, and gave to our Southern States an almost immediate supremacy in the markets of the raw fibre. But to Richard Arkwright belongs the honor of seeing in the machine not merely a more effective type of individual tool or implement, but as the basis of the modern industrial organization wherein each man was trained to a separate function, and where mechanical organization and the human element were so coordinated as to make the conversion from cotton fibre to cotton yarns and fabrics a continuous performance.

It must be admitted that the sagacious minds in America watched these great and carefully protected inventions in England with shrewd understanding, and in spite of the prohibitory laws passed by the British Government to protect them, at a very early date adaptations and modifications began to appear in America. George Washington in 1785 writes in his diary of seeing a machine in Beverly, Massachusetts in a small mill owned by the Cabots, that spun a large number of cotton threads in a single operation. The machine he refers to was apparently some modification of Hargreave's spinning jenny. And in 1790 Samuel Slater, founder of the Slater Mills of today,

reproduced the carder and the spinning machinery of the Arkwright Mill in which he, himself, had been an apprentice. Within a generation of this beginning, over one hundred cotton mills had been started in America, and these included not only spinning but weaving mills.



Original Slater Mill, Pawtucket, R. I., first successful modern cotton mill in the United States.

The founders of the cotton industry in New England properly and naturally directed their efforts towards the existing markets in America. When the first mills were established along the water-power sites of New England, the westward limits of this country were the Alleghany Mountains. Spain and France still held a more or less precarious title to the greater portions of the territory now occupied by the United States of America. Neither Boston, Philadelphia nor New York City had a population of fifty thousand inhabitants. There was neither steamboat nor railroad train. The soldiers who had gallantly fought in the Revolutionary War were still seeking to adjust themselves to the obligations and opportunities of peace. It was in a large sense a frontier population, demanding of its textile industry sturdy, usable fabrics at comparatively low costs. The

hand-loom and the home spinning-wheel were in almost every farmstead. Outside of a few cities, the simplest luxuries were unknown, but even in the earlier stages of our development, the need for fine cotton goods became apparent. And this need was met by the energy of New England.

There is at the far end of Buzzard's Bay the little city of New Bedford. Back of it lies a splendid tradition and an interesting and romantic history. The nature of the country, no less than the inclinations of its early inhabitants made it a maritime center. Here at a very early date the whaling industry developed to greater proportions than anywhere else in the world.

New Bedford's ships and New Bedford's seamen were known all over the world, and in the Far East for a long period of time, the United States was regarded as the suburbs of New Bedford, since by far the greater proportion of the American ships that put into these ports had the name of this little city on the stern.

Our national life had not reached its half-century mark when certain far-sighted men in New Bedford realized that the future of this city lay rather in the cotton industry than in the romantic pursuit of the whale. Other cities in New England, well-known to these sagacious men, had already developed the staple business in cotton fabrics to such an extent that these offered little opportunity. They realized that if they were to have a satisfactory economic existence, they must select the types of fabrics that up to this time had been imported, and thus lay the foundation of the fine yarn industry in America.

This reasoning was sound and based on shrewd observation and intelligent calculation. But there is another reason which may not have advanced as enthusiastically as the more obvious economic explanation, and this was the fact that the old whaling captains had for generations made it a practice, when touching at the ports in the Orient, to bring back the shawls of Persia, the silks of China and Japan, and the beautiful painted cottons and muslins of India. The effect these treasures had on the ladies of New Bedford unquestionably aroused the interest of the gentlemen. The conditions were to a certain degree the same as in England when the first circumnavigators of the globe began to bring to her markets these same textures. The rapid and sturdy growth of this industry during the next few years is evidence sufficient that their judgment was sound and the market ripe to accept the fruits of their effort.

The growth of New Bedford as a center of fine cottons is one of the most dramatic and interesting episodes in economic America. Still to this port come a few storm-battered, weather-worn schooners

and square riggers, scarcely larger than the pleasure boats of the wealthy mill owners. They still seek in distant oceans the whale. A contrast of the greatest romantic interest is to see one of these old boats moored within the shadows of the great cotton mills—the past and present symbols of New Bedford's economic life.

An industry of such vital importance as the manufacture of cotton goods, an industry with so splendid a tradition for energetic activity and clear vision, must of necessity spread out. The same attitude of mind that brought American mills at once in competition with English mills, that met successfully our own great economic and industrial problems, must have an outlet.

The building of new cotton mills wherever natural conditions favor and wherever there is an available supply of labor, is but a natural healthy growth.

New England's early history is now being repeated in the South, but just as the building of mills in America in no-wise impeded the growth of mills in old England, so the building of mills in our Southern States need have no effect on the orderly economic development in our Eastern States. We forced English spinners, weavers, dyers and printers to greater mechanical and artistic perfection, and are in turn being forced by the offspring of our own mechanical genius, to extend into new fields.

The necessity to exercise ability to its capacity is one of those hardships which build character and make for success. The buried talent is ever unfruitful.

There is, however, one great difference in the present situation and past history. When New England developed her types of staple fabrics, when the great organizations began to grow to their present size and form, they grew in accordance with the devlopment of the market in this country. It was our frontier period, when each year saw a new frontier and new states moulded from the wilderness. For a long period of time only cotton fabrics of utility and service and low cost were desirable. But we have reached a new phase in national development. Our increase of wealth and culture, the rapid growth of the urban population, the rapidly narrowing distinction between rural and city communities in the point of taste, the speed with which fashions permeate all the classes of each community, have completely changed the market's tone. Only in our most backward communities, only in regions where the average wealth is small in comparison with the general average, only where racial and social distinctions are marked and obvious, can inferior merchandise and poor designs still find a market on price alone.

These conditions will be enhanced during the next decade. Even

in this generation the purchasing power rests with a group of young people more conversant with the canons of good taste, more familiar with the laws that govern good design, and infinitely more individual than those who dominated the fashions and style inclinations of the past generation.

The impulses which govern styles must always be determined by the taste of artists and craftsmen and stylists in the great cities. And no mills can successfully compete for this enlarging market which are not in close touch and sympathetic accord with these international factors.

It is by no means a simple problem to lead an industry as individuals or as a group to new standards of production, and to new concepts of the problems of what to produce. It will be solved in the long run by the composite results of many individual ambitions and undertakings. It will meet complete success only after years of patient research, investigation and experiment.

Out of all the dim centuries in which man sought in nature to discover the perfect textile fibres, four distinct types have stood each

Ancient whaler, "Charles W. Morgan," eighty years in active service with background of modern industrial New Bedford.

test, measured up to each full opportunity—flax, wool, silk and cotton. Around each lies a romantic, artistic and economic history, rich in traditions, fruitful in accomplishment. Certain sterling qualities they all have in common, certain merits are peculiar to each. In certain regions and ages each fibre has risen to supreme distinction, and each has borrowed from the other, design, color and texture. If among one people, in one epoch, a certain fibre led the world's desire, the artistic hunger of the next age was satisfied a little more perfectly by another.

Since, intrinsically, each represents natural perfection, there can be little choice between them except such choice as is conferred by the spirit and methods of conversion. In every age one fibre rises above the historic horizon and achieves an international distinction based upon design.

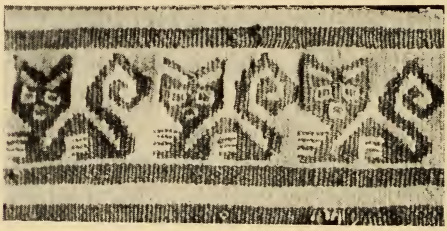
When Alexandria supplied the world with fabrics of flax, it was because of beauty. When China and Asia Minor and Italy were the centers of the silk market of the world, they were as well the centers of artistry in fabrics. The woolen fabrics from old Persia still charm us with color and design in priceless rugs, and these colors and these patterns were once used in the fabrics for wearing apparel.

The cottons of India, that for three centuries were the desire and envy of Europe, were so because upon their manufacture had been expended not only patient skill, but a sensitive understanding of color, mass and form, and a shrewd evaluation of the influence of these considerations on the desire of the rest of the world to purchase.

In this brief history, I have omitted intentionally the discussion of many vitally important factors. There is much of interest in the commercial history of the early centuries in which India reached out for the markets of the world in fine cotton goods. There are problems today in all modern industries that may only be solved by a thorough knowledge of the great Eighteenth Century in England and America.

I realize the vital importance of both of these problems, and did time permit, would gladly have elaborated these portions of this modest discussion. But the great fact that is before us today, the

problem that must be solved, is one of design, art or fashion. I have, therefore, attempted to confine myself to the consideration of the effects of good artistry on cotton commerce in many centuries, and to leave to the reader the task of drawing conclusions.



REPORT OF THE EXHIBITION COMMITTEE

During the last century and a half, cotton has been the theme of a great mass of technical literature. About this modern miracle of mechanical production, men have been, and still are, justly curious. Cotton led the great nations of the West into a new era of fabric production. The lessons taught in the first cotton mills of England and America have changed not alone other fabric industries, but all methods and systems of producing wealth. We are still too near this immense revolution to see the full magnificence of its promise; too close to see that we have before us not the old mechanical and technical problems, but the more delicate one of adjusting the human element to the new factors.

The character of the cotton fibre ideally fitted it for machine production. As a hand-craft it eluded the skill of Europe during three centuries of Europe's keen desire to possess it. Suddenly, through a few inventions, within the span of an average human life, all was changed. England and America became the great producing countries of the world. It is natural, in such a complete shifting of economic power, that great changes should take place. It was an excusable, if grievous error, that the new-found economic cheapness should have been mistaken for a lack of intrinsic merit. Great as was the new power, it cannot be questioned that it brought with it a gradual falling off of the high standards of design that for centuries placed cotton fabrics in the first order of desirability.

The frank purpose of this modest exhibition is to focus the attention of the executives of Eastern cotton mills on the problems of design and fashions. A brief outline of the artistic history of cotton, covering its great art epochs, a few specimens of fine American cotton fabrics, indicate the relationship between a common history and our present aspirations.

For several years these problems have been discussed before association meetings both by members of this association and visiting speakers. But in the confusion of the post-war times, in the recent trying economic and social developments and entanglements, the

subject has been allowed to rest as a theory rather than be experimented with as a fact.

Briefly, we wish to draw the attention of the cotton industry in New England to the broad opportunities offered us by our home market, for better, more highly developed types of cotton fabrics—to urge a closer sympathy with the artistic factors which dominate the great style industries of America.

The silk industry, in one energetic and resourceful generation, has proved conclusively the value of such a course. The American silk industry is today by far the largest of its kind in the world, and in point of energy and resourcefulness, second to none. The increasing importation of fine cottons from the looms of France and England is additional proof, were such needed, that this is a market for luxuries, and that the day of the so-called "staple" has passed, except for a gradually narrowing market in sections of the country where mechanical facilities are already ample for their needs. The disorder in all European markets makes it certain that greater efforts to sell imported cotton here will be made in the near future. This is competition we must meet with quality as well as price, consider the wishes of our markets as well as general economic factors.

In the Boston meeting of April, 1920, Miss Jessie Turner, a well-known costume designer of New York, was our guest, and spoke on the problems of cotton designing with great vigor and intelligence. We quote her remarks in full:

"It is my belief that the cotton industry of our country has still untouched an enormous field of opportunity. Its great achievements of place and distinction make it seem fitting that it should now reach out for the higher developments—to meet the esthetic needs. In fact, I am of the opinion that to maintain its present strong position, it must give more attention to design. It must create something distinctively its own. By that I do not mean that it should or could, make designs wholly foreign to anything done before—for that, of course, is impossible. But it can create a national distinction. Surely, the life of our people, our manner of living and the American tradition has a message of its own.

"One of the most serious drawbacks to our American industry has been the copying of European designs; for copies make no appeal to the public other than cheapness. The demand is here for productions of originality, and unquestionably, the standard of taste is for better goods. It is so in laces, watches, motor cars, and many other industries. Does that not show us that, with good taste, vision and courage of conviction, a still untouched field may be developed?

"The cotton industry has tremendous possibilities, and its use could be dignified to far greater extent. Because it is cheap does not prevent its being beautiful, and the fact that it is within the reach of all is the strongest reason for making it so. In my own establishment, I have repeatedly reached out for cottons, as a matter of choice rather than economy, but have never found in this country designs of sufficient interest for my use.

"I feel certain that the development of this phase of the cotton industry would result in enormous value to the manufacturer."

Mr. Samuel B. Lowe, former president of the National Association of Cotton Manufacturers, in reply to Miss Turner's interesting address said:

"Miss Turner brings up a very interesting subject. Not so long ago I was in New York when this same matter was brought up—the demand of the American public for finer fabrics. There is no doubt there is an opportunity for us as cotton manufacturers to supply the demand. Miss Turner speaks of Paris and London. I was, not so very long ago, in New York, and then a few days later I was in London, and a short time before in Paris; the thing that impressed me most on that trip was the superiority of the dresses of the American women. I am satisfied that the American woman is by far the best-dressed woman in the world today, and the designs of American designers are in my opinion not surpassed by anything of their kind. I was asked why there were not more American designs; why the American manufacturer did not produce more designs. I answered that the American manufacturer wants to sell a case of goods. There is an opportunity for large profits in small product work for any manufacturer who will make it up and go actively into it. But a manufacturer with a plant today will put his looms on warp lots and produce in quantity."

In President Amory's address on October, 1922, he gave careful consideration to this subject and forecast for the Association and the individual members the needs of this rapidly changing market.

FINE GOODS MILLS

"How to consider the rapidly increasing type of mill, which for want of a better term, we will call "fine goods mills." These are goods which are made for special purposes, and are largely to fill the demand caused by fashion. A woman will refuse to buy staple cloths at an advance of one-quarter cents a yard, probably because she is saving money to buy an expensive automobile, but, at the next counter, she will not hesitate to spend $100 for a dress that strikes

her fancy. You must remember that you can sell a woman what you want to make at her price, but if you make what she wants, you can name your own price."

STYLE APPEAL AND BEAUTY OF COTTON FABRICS

"Cotton manufacturers, as a rule, have neglected possibilities of style appeal and beauty of cotton fabrics. They should take a leaf out of the book of silk manufacturers who have tempted the women of this country with all sorts of new and fascinating things. Some of them have done so most successfully."

COOPERATION

"The best sales force in the world cannot long obtain any extra price per yard for staple goods made by one mill as against the general market, but a good, resourceful and imaginative sales force, acting in the closest cooperation with an active and inventive manufacturer can produce profits that are undreamed of by the staple mill.

"This calls for the closest harmony and cooperation between the sales force and the mill and between the various departments of the mill itself. There is not only the possibility of profit in this method, but there is much satisfaction to be had in building up quality and making goods of higher and higher grade."

Other efforts to raise the artistic status of cotton have been made by institutions and individuals outside of the limits of this Association. The Brooklyn Institute Museum and the American Museum of Natural History, have not only opened their collections to the designers from all textile industries, but have united in common exhibitions to show the great retail stores and women's colleges of America the artistic history of the cotton fibre. For the first time in the history of such organizations, material of high artistic merit and great intrinsic value, has been permitted to be exhibited outside of the museums themselves. The influence on national taste of such unselfish and intelligent consideration of the problem, can hardly be estimated.

The first of these exhibitions was known as "The History of Art in Cotton," and was organized under the direction of the Design Department of Women's Wear, and exhibited in the following cities:

Washington, D. C.	Toledo, Ohio
Dallas, Texas	Fall River, Mass.
Baltimore, Md.	Trenton, N. J.
Columbus, Ohio	El Paso, Texas.
Sioux City, Iowa	St. Paul, Minn.
Denton, Texas	Chicago, Ill.
Ames, Iowa	Pittsburgh, Pa.
Erie, Pa.	Iowa City, Iowa
Brooklyn, N. Y.	Bridgeport, Conn.
Woonsocket, R. I.	New Bedford, Mass.
St. Louis, Mo.	Rochester, N. Y.
New York, N. Y.	Minneapolis, Minn.
Boston, Mass.	Manhattan, Kan.

The success of this exhibition was so great, that it was decided to call it back from the road, reorganize it, amplify it, and put it directly under the guidance of a committee selected from the cotton industry itself. This exhibition was known as "Thirty-Nine Centuries of Cotton Development." It is still on exhibition, traveling all over the United States. We have already received eighty requests from retail stores for this exhibition, but it has been impossible to grant them all. Up to the present time it has appeared in the following cities:

Waco, Texas	Cincinnati, Ohio
Lincoln, Nebraska	Boston, Mass.
Chicago, Ill.	Philadelphia, Pa.
Cleveland, Ohio	Spokane, Wash.
Columbus, Ohio	Seattle, Wash.
Pittsburgh, Pa.	Portland, Ore.
New York, N. Y.	St. Louis, Mo.
Cedar Rapids, Iowa	San Francisco, Cal.

We mention these facts to prove the already great and obviously growing interest on the part of the retail stores of America for higher types of cotton merchandise. If an artistic exhibition attracts their attention and causes them to give time, money and energy to its exploitation, how much greater would their interest be in actually vendable merchandise of an equally high artistic character?

Our public will have fabrics of artistic and intrinsic merit, if not in cotton, then in silk or woolen mixtures. If not from one set of looms then from another. If not in America, then from abroad. This market knows no guide but its own caprice. You may call it style, the vogue, or fashion. You may praise or deplore it as you will. At bottom it is an artistic instinct. Our public wants beauty, the lure

that drew the keels of the world's fleets to cotton's ancient home in India; that guided the endless caravans and led men to strongly venture on the world's broad, unknown highways when each mile was filled with lurking danger.

The mere fact that a few machines were invented during a certain age, that during the following generations these machines were perfected, and that now cotton goods are made by the mile rather than the inch, and that they are economically less costly than fabrics from other fibres, has not changed human nature nor man's fundamental longing for beauty. Deny this fact, and no power on earth can preserve your organization in the face of extreme competition. But, make your mills feed this hunger, and cotton will again fill the world with a keen desire to possess it—a desire that will match at least your power of production.

In our judgment the next step on the program will be the formation of a committee in the Cotton Manufacturers Association to devise a plan to meet the present situation and bring to the attention of the merchants of America, and the vast public they serve, the high intrinsic qualities of cotton, and pave the way for the great achievement in cotton designing and cotton construction, which the next decade must surely see.

THE COMMITTEE.

THE MARCH OF COTTON

Chronologically arranged

List of Inventions on Page 41

800-700 B. C. Cotton cultivation and conversion is seen to have been long established in India, from references in the law books of Manu.

400-300 B. C. Knowledge of cotton is first brought to the Greeks through Herodotus and the chroniclers of the campaigns of Alexander the Great in Central Asia and India. Other writings of the period refer to the exportation of Indian cotton products through the carrying trade of the Arabs.

300-200 B. C. Cotton cultivation and conversion reach the shores of the Mediterranean via Asia Minor.

70 B. C. The Romans use cotton tents and awnings and canopies. Compared by Lucretius with the white clouds of heaven.

70 A. D. Pliny reports cotton cultivation and manufacture in Upper Egypt. The priests' garments are made of cotton.

100-200 A. D. Cotton is grown in Elis (Greece) and here and there also manufactured into hair nets. This is the first recorded instance of cotton grown and manufactured on European soil, but the industry remained isolated.

200-300 A. D. Arrian writes that calicoes and muslins were shipped from India to Adule, an Arab port on the Red Sea.

600-700 A. D. Cotton was cultivated in China as a decorative plant.

798 A. D. Cotton first reached Japan through a shipwrecked inhabitant of India. The cultivation was later abondoned.

912-961 A. D. Cotton culture and manufacture were firmly established in Spain under Abdurrhamans III, and also in Sicily under Arab rule.

1050 A. D. This is the date of the earliest extant specimen of cotton paper, in the manufacture of which the Arabs of Spain are said to have excelled.

1096-1270 A.D. The Crusades introduced Europeans to the varieties of Levantine and Occidental cottons, disseminated a knowledge of cotton goods, and initiated first an industry in the Crusader states of Asia Minor, and later a lively trade in cotton goods between the Italian city states and Asia.

1200-1300 A.D. The Tartars introduced cotton cultivation and use into China. This knowledge was afterwards introduced into Korea.

1200-1300 A.D. The earliest references to cotton appear in contemporary French and English writings. Cotton was first used for candle wicks in England, and also as trimmings for doublets. In France, cotton seems to have been used to make hats. Other references of the same period mention cotton as used in the form of a defensive pad in warfare and also as part of fortifications.

1200-1300 A.D. Barcelona flourished as a cotton manufacturing centre, specializing in cotton sail cloth and fustians.

1320 A. D. Oppel claims that Ulm in Germany was the first place in Central and Northern Europe where cotton is spun and woven. Venice claims the honor for Europe.

1350-1400 A.D. Cotton cultivation reached the Balkan peninsula through the invasion of the Ottoman Turk.

1375 A. D. English literary references indicate that cotton goods were being imported as a usual thing.

1492 A. D. Columbus discovered cotton in the Bahamas. On his return trip, Europe got its first glimpse of Sea Island cotton.

1520 A. D. ca. Magellan reported cotton in Brazil.

1560 A. D. Ghent and Bruges were famous for their printed cotton goods.

1592 A. D. The Portuguese reintroduced cotton into Japan.

1600 A. D. This is the date given by some authorities as the beginning of real cotton manufacture in England, coincident with the coming of Flemish refugees from the Netherlands.

1619 A. D. Cotton was grown by the colonists along the rivers of Virginia.

1621 A. D. London wool merchants protested against the growth of cotton manufacture, alleging that 40,000 pieces of mixed cotton and linen fabric were being produced yearly in England.

1641 A. D. This is the date set by George Bigwood as the real beginning of the cotton industry in England. Prior to this date, he says cotton was only used in England to make candle wicks.

1678 A. D. Pamphlets indicated that cotton goods were gaining popularity in England.

1700 A. D. Cotton cultivation in North Carolina furnished one-fifth of the population with clothing, the cotton being mixed with other fibres to produce cloth. Every farmstead had its cotton patch.

1700-1739 A.D. The West Indies and Brazil were the great cotton producing countries of the New World.

1721 A. D. Parliament passed a law protecting the wool interest in England, fining anyone who wore a dyed or printed calico.

1736 A. D. The Manchester Act was passed, allowing mixed (cotton and wool) calico to be manufactured, while importation of Indian goods was still forbidden, thus giving Lancashire the monopoly in cotton goods.

1750 A. D. 30,000 people in Manchester and Bolton districts were concerned with cotton manufacture.

1753 A. D. South Carolina sent a few pounds of cotton to London.

1764 A. D. Eight bags of cotton were sent from Carolina to Liverpool.

1770 A. D. Three bales of cotton went from New York to Liverpool, ten from Charleston, four from Virginia, and three barrels from North Carolina. (*Note:* A bale or bag at that time was computed at 200 lbs.)

1775-1783 A.D. Cotton manufactures in America were stimulated by the cotton goods famine incident on eight years of war.

1783 A. D. The first piece of cotton goods entirely made of cotton was produced in Lancashire.

1784 A. D. The first recorded shipment of American cotton arrived in Liverpool. The eight bags were seized by British customs officials on the ground that it cannot possibly be American cotton, and afterwards released.

1785 A. D. Steam was first used in the cotton industry.

1786 A. D. 600 pounds of American cotton were shipped to Liverpool.

1787-88 A. D. The first permanent cotton factory, built of brick, at Beverly, Massachusetts, was put into operation by a group of men headed by John Cabot and Joshua Fisher. It was not an economic success.

1788 A. D. A factory was built at Philadelphia equipped with expensive machinery for carding and spinning cotton.

1788 A. D. Richard Leake of Savannah announced a new staple and decided to experiment with eight acres planted with cotton seed.

1789 A. D. 127,500 pounds of American cotton were exported.

1790 A. D. Samuel Slater migrated from England and puts up a factory at Pawtucket, embodying the coveted English inventions.

1790 A. D. 3,138 bales of 500 pounds each were produced in America, and 379 bales were exported.

1792 A. D. Some time between 1769 and 1792, the factory system was Instituted in England as applied to cotton spinning.

1810 A. D. 177,824 bales of 500 pounds were produced in America and 124,116 bales were exported.

1812-1815 A.D. War with England stimulated American manufacture.

1820 A. D. Factory system began to be applied in England to the weaving industry as well as spinning. At that time there were seventeen times as many hand looms as steam looms in the country.

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